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SOME RECENT ADVANCES
IN THE
DIAGNOSIS AND TREATMENT
OF THE
ABSCESS OF THE ANTRUM OF HIGHMORE.

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presented by the author



Some Recent Advances in the Diagnosis and Treatment
OF THE
Abscess of the Antrum of Highmore.

At the last meeting of the American Medical Association, in a paper on the "Diagnosis and Treatment of Abscess of the Antrum,"* I called attention to the fact that this disease occurs much more frequently than has been supposed. In that communication, I reported four cases; since then, my experience has been still further extended by the three cases I have the honor to report to-night.

The accessory cavities of the nose being lined by mucous membrane, continuous with the lining membrane of that organ, are especially prone to a continuation of an inflammation affecting it; and owing to the very intimate anatomical relation which these cavities bear to each other, it is difficult to say which of them is the seat of the disease.

Before proceeding further, let me call your attention to some of the objects found in the lateral wall of the nose, a perfect familiarity with which is necessary to enable us to understand some of the complex symptoms of these diseased cavities.

The three turbinated bodies divide the lateral wall of the nose into the superior, middle, and inferior meatus. Of these, the middle meatus is the most important. The objects to be observed are the hiatus semilunaris, a semilunar groove between the processus uncinatus behind and the bulla ethmoidalis in front, varying in length and depth in different subjects from a mere slit to a deep groove. This groove contains the ostium maxillare, and as it passes upward and outward terminates in a funnel-shaped depression

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known as the infundibulum, into which the frontal sinus and the anterior ethmoid cells empty. You will observe that in this meatus we have two openings very close to each other, viz: the natural opening of the maxillary sinus and the opening into the infundibulum. Occasionally, there is a third opening, known as the ostium accessorum of the maxillary sinus, situated below and in front of the natural opening.

The maxillary sinuses will be found to vary in size in different individuals; and frequently, in the same subject, one cavity will be found larger than the other.

Zuckerkandl speaks of dilatation and contraction of this cavity; but there is an anomalous condition which I have not observed noted, and which I think is worthy of record, as it may assist in explaining the obstinacy with which chronic abscess of the antrum frequently resists treatment. In specimen No. 2325 of the Army Medical Museum Collection, prepared by Dr. J. L. Wortman, anatomist to that institution, the antrum of the right side has three openings into the middle meatus. The posterior one is the largest, occupying a position slightly behind the middle of the inner wall, and upon a level corresponding to the lower edge of the middle turbinated bone. The middle opening is smaller, and has a position slightly above and behind the normal aperture. The anterior opening is normal so far as its position is concerned, but it communicates with a deep groove just in advance of the hiatus semilunaris, which leads into the opening of the frontal sinus. By means of this groove, it is possible to pass a probe from the cavity of the antrum directly into the frontal sinus, although, in so doing, it is made to enter the middle meatus first. The natural channel for pus or fluid coming from the frontal sinus would be into the antrum, in preference to the middle meatus.

Of the accessory cavities of the nose the antrum of Highmore is the most important from a pathological standpoint, it being more frequently the seat of disease than the others.

Suppurative inflammation is the form of disease most frequently met with, and the most common causes are an ex-

tension of the inflammation from a suppurating pulpitis of a tooth, or an extension of an inflammation from the lining membrane of the nose.

According to my own experience, I believe that diseased teeth are the most frequent cause; others, however, hold that the inflammation more frequently has its origin in the nose, either from a direct extension of the inflammatory process into the antrum, or, as Bosworth* claims, by an hypertrophy, or any other pathological condition, such as polypi, that will close the natural opening and pen up the secretions in the cavity.

Nearly all observers are of the opinion that the diagnosis of an abscess of the maxillary sinus is surrounded with considerable, and often insurmountable difficulties. I can recall cases in my own practice in which I have been unable to make a satisfactory diagnosis. Any method, therefore, that will enable us to solve these difficult problems will be gratefully received by all who have these affections to treat.

The symptoms that are laid down as characteristic are found occasionally to be wanting; and some are common to abscess in one or more of the other sinuses communicating with the nose. They will be found to vary according to whether the natural opening of the antrum in the middle meatus is closed or free. If closed, there will be intense neuralgic pains in the affected side of the face; pain on pressure; a crepitating sensation imparted to the fingers, due to a springing of the distended walls of the cavity; and frequently a bulging of the lateral wall of the nose.

When the ostium maxillare is open, there will be a discharge of fetid pus from the nose, unilateral, unless both cavities are affected; varying with the position of the head, and the condition of the nose; flowing forward when the head is bent on the chest, and backward into the nasal pharynx when in the recumbent position.

On examining the nose, pus will frequently be found in the middle meatus, and, upon close inspection, a pulsating

* *Op. cit.*

light reflex is occasionally seen, such as is observed in perforations of the membrana tympani in suppurating otitis media. This symptom, when present, is regarded by Walb and Schöller as pathognomonic of abscess of the antrum. I have observed it only once, and in that case it was well-marked.

Occasionally, most of the above-mentioned symptoms are wanting, the patient complaining simply of a nasal discharge with a bad odor. Upon examining such a case, the nasal chambers may be found free from pus and in a normal condition.

Moritz Schmidt,§ of Frankfurt, has given us the most practical method of recent times for determining the presence of pus in the antrum—that is, aspirating the cavity through the lateral wall of the nose. When pus is present, it can be drawn off in the small syringe used. He recommends that the inferior meatus be thoroughly anaesthetized with a 20 per cent. solution of cocaine, and by means of a small syringe, somewhat larger than an ordinary hypodermic, with a strong curved canula, sharp at the end, he perforates the lateral wall about the middle of the inferior meatus. I have used this instrument as he directs on several occasions, and I find the bone is much thicker here than is generally supposed, so that, in spite of the cocaine, the operation is quite painful. Instead of aspirating through the inferior meatus, I now make the puncture in the middle meatus just above the inferior turbinate body. Here the wall is extremely thin, and, if the instrument has a sufficiently long curve, it can be made to reach near enough to the floor of the cavity to ascertain the presence of pus. This procedure has been objected to by some on account of the danger of wounding the floor of the orbit. There need be no fear of an accident of this kind if the point of the instrument is carried downward and outward.

There are, however, cases where so trivial an operation as this would be objectionable, especially in weak and hysteri-

cal women. We may, then, have recourse to the method recently advocated by the late and lamented Voltolini, of Breslau. Voltolini, adopting a suggestion of Czermak for examining the larynx by means of transmitted light, made use of the same principle in examining the cavities of the head. He found the bones entering into the formation of the face and nose were translucent. Instead of using the sun-light, as suggested by Czermak, he made use of the electric light, and found that, in the majority of cases, the bones were sufficiently thin to permit the passage of light through them. He then used the electric lamp to diagnose the diseased conditions of the antrum of Highmore.

The efficiency of the procedure has been testified to by such men as Störk, Gerhardt, Heryng, and others.

Heryng, in an interesting article on the electrical translucency of the antrum of Highmore,* gives a series of cases he was able to diagnose by this means. He advises the use of a small Edison's electric lamp (five volts), attached to a Türk's tongue depressor, and connected with a battery. Before using, the room should be darkened, and the depressor, with the lamp attached, introduced into the mouth. The tongue should be well-depressed before the mouth is closed, for the lamp becomes very hot, and it will burn the patient if allowed to come in contact with the mucous membrane. The current is then turned on, and the maxillary sinuses, if in a state of health, will become illuminated up to the lower eyelids. If, however, one of the cavities is the seat of an empyema, or a solid tumor, that side will remain opaque, while its fellow of the opposite side will be illuminated.

Cysts of the antrum are found to be translucent.

I have proved the translucency of the maxillary sinuses in several healthy subjects; but since I became familiar with this procedure, I have not had an opportunity of trying it in a case of abscess of the antrum. This simple and painless device will assist us to diagnose a diseased antrum, but

* *Berl. Klin. Wochenschr.*, September 2d and 9th, 1889.

it cannot tell us the form of disease present without taking into consideration the accompanying symptoms.

Another aid to the diagnosis of abscess of the maxillary sinus, none the less practical, but more difficult of carrying out, is sounding—that is, passing a small probe through the ostium maxillare; and if pus be present, it will flow out into the middle meatus. To successfully sound the antrum, much depends on the size and position of the middle turbinate. If it is unusually developed, and overlies the middle meatus, it will be impossible to introduce a probe into the opening of the maxillary sinus, or into the opening of the frontal sinus. Again the size and depth of the middle meatus has an important influence on the success of the procedure.

Hansberg,* of Dortmund, gives the following directions for sounding the maxillary sinus; a small probe is used about 15 cm. in length and $1\frac{1}{2}$ mm. in thickness. The probe is bent 6 mm. from the end at an angle of 110° ; then, with the aid of good illumination, the parts having been previously anaesthetized with cocaine, the probe is introduced into the middle meatus, and the opening searched for, care being taken not to wound the membrane, as the resulting haemorrhage will be sufficient to obscure the field of vision, and render further probing useless. Entrance into the cavity is readily recognized by the resistance offered to the to-and-fro movements of the probe. Pus, if present in the cavity in sufficient quantity, will flow out into the middle meatus upon the withdrawal of the instrument.

There are four operations for the relief of abscess of the antrum, viz: Cooper's, through the alveolar process; De-sault's, through the canine fossa; Mickulicz's, through the inferior meatus; and Bertrand's, through the palatine process of the superior maxilla. In selecting one of these methods, we must be guided by the cause of the abscess; whether it be induced by dental caries and suppurating pulpitis, or whether it has an intra-nasal origin. If pro-

duced by disease of the teeth, then the alveolar operation should be selected ; the affected tooth, generally the second molar, withdrawn, and an opening made into the floor of the antrum. It frequently happens that the offending tooth has been lost before the patient comes under observation ; then the opening should be made in this vacant space. This is best done by means of a drill, or trephine. I prefer the trephine, and have used one with a diameter of 3 mm. This leaves too small an opening, and I believe more satisfactory results would be obtained by the use of an instrument at least 8 mm. in diameter. The opening should be sufficiently large to admit of the ready removal of any necrosed portion of the alveolar process, and to permit of a free drainage.

When the cause is seated in the nose, such as nasal polypi, hypertrophic rhinitis, or a direct extension of the inflammatory process into the maxillary sinus, the operation recommended by Mickulicz, somewhat modified, will enable us to treat the abscess without the removal of a sound tooth, which is frequently a matter of great consideration. Mickulicz advised opening the sinus through the inferior meatus by means of a sharp double-edged knife. The disadvantage of this instrument is that the resulting opening is too large, and the operation is frequently attended with severe haemorrhage. I have opened the antrum once through the inferior meatus, and used a small burr or drill devised by Dr. J. Solis-Cohen. It consists of an olive pointed burr attached to a small stem, encased in a canula sufficiently large to admit of the withdrawal of the burr after the bony wall has been perforated. The canula can then be left in the opening until the cavity has been thoroughly washed out. The instrument is propelled either by means of an electric motor or a surgical engine.

This operation has the advantage of draining the cavity at its floor, without leaving a large ragged opening in the lateral wall of the nose. Every attempt at blowing the nose aspirates the cavity and keeps it free from pus ; and the patient is saved the annoyance of having the secretions

pass into the mouth; bacteria and food cannot get into the sinus, as in the alveolar operation, and assist in keeping up the inflammation.

Bertrandi's operation is one that should never be resorted to.

The operation of Desault was held in high esteem by some of the older surgeons, but it is not so often used to-day. If the abscess points in the canine fossa, then of course it should be opened there. In severe and obstinate cases a counter opening to that in the inferior meatus can be made by resecting a small piece of bone from the canine fossa, and packing the cavity with iodoform gauze, as recommended by Semon.

After the opening has been made, the cavity should be thoroughly washed out with a warm solution of salt until all signs of pus have disappeared. The invariably accompanying fetor is best overcome by means of a five per cent. solution of permanganate of potash.

Owing to the peculiar shape of the maxillary sinus, and frequently the long existence of the inflammation before it is discovered, the treatment is often very tedious. The cavity should be syringed out, if the inflammation is at all severe, two or three times a day with mild disinfectant solutions. The peroxide of hydrogen and glycozone have acted well in several of my cases.

Friedländer has recently reported a series of successful cases that he was able to cure in the unusually short period of two weeks. He recommends the opening in the inferior meatus, and after thoroughly washing out the cavity he dries it out with an air-bag and insufflates iodoform.

The following is a report of three interesting cases that have come under my observation recently, and as the first case is an instructive one I will give its history in detail:

CASE I.—Mr. D. E. C. consulted me last May for reflex nasal asthma, stating that he had always enjoyed good health up to eighteen months ago, when he was troubled with frequent head colds, which from neglect and exposure increased in intensity until he was forced to seek relief.

He had frequently facial neuralgia and pain over the bridge of the nose, symptoms of nasal closure, cough, and a constant secretion dropping back into the nasal pharynx. There has been very little secretion from the front of the nose. About four months prior to consulting me asthma commenced, and the paroxysms have increased in intensity. He has lost flesh and strength rapidly, and he is unable to concentrate his attention on his work. The only relief he has had was during a short stay at Key West, Florida.

On examination the patient presented a pale and an emaciated appearance.

Examination of the lungs revealed numerous sonorous and sibilant râles. Heart sounds were normal. Examination of the nose showed both chambers tightly blocked, and the membrane bathed with a thin serous fluid. On the application of a twenty per cent. solution of cocaine, the swollen inferior turbinals contracted sufficiently to enable the middle turbinated bodies to be brought into view, showing numerous small fibro-myomatous polypi springing from them and tightly blocking up both nasal chambers.

The polypi were thoroughly removed, and the middle turbinated bodies cauterized with the galvano cautery. As a consequence of the treatment, the asthmatic attacks were much less frequent and severe, but the cough and post-nasal secretion continued about the same. Owing to the highly nervous state of the patient, it was impossible, even with the aid of cocaine, to make a posterior rhinoscopic examination.

There was considerable hypertrophy of the inferior turbinated body on the right side, which was reduced by means of the galvano-cautery. Upon removing a slough one morning resulting from a cauterization, the middle meatus suddenly filled with thick creamy pus, presenting a pulsating light reflex, such as is occasionally observed in perforations of the membrana tympani in suppurating otitis media.

Upon further examination, the upper second bicuspid and the first and second molar teeth on both sides were found to be absent. There was no swelling of the right side of the face, and no pain on pressure.

The diagnosis of abscess of the antrum having been established, I trephined through the alveolar process about the seat of the second molar tooth, and syringed out the cavity with a tepid solution of common salt. A large quantity of very fetid pus came out through the nose. The

cavity was washed out twice daily with peroxide of hydrogen and an antiseptic alkaline solution, with the result of greatly diminishing the secretion of pus. After the abscess had been opened the patient felt greatly relieved, the asthma subsided almost entirely, and he was able to sleep the night through—something he had not been able to do for several months. The cough and post-nasal secretion ceased.

About this time, August 1st, I left the city for my vacation, and did not see the patient again until October 5th, when he presented himself again for treatment, stating that during August he contracted a severe cold, which caused a return of the asthma and of the inflammation in the antrum.

Upon examination of the nose, I found the polypi on the left side had re-developed, and they were much larger and more myxomatous in character. There was considerable pus found in the middle meatus after the polypi were removed. As it was impossible to say what its source was, I aspirated the antrum, but did not find any secretion. By means of the probe I was able to determine that there was considerable necrosis of the middle turbinated body present.

The patient was recommended to go to the Garfield Hospital, where a more thorough examination could be made with the aid of an anæsthetic. On November 11th, he was etherized, and with the little finger passed into the left nasal chamber as far as it would reach, I found the middle turbinated bone very friable, breaking down under slight pressure; small spicula of bone were felt high up, projecting across the vestibule of the nose, and probably impinging on the septum.

On the right side the middle turbinated bone was smooth and firm.

With a sharp curette passed into the left nasal chamber, I scraped away all the broken down tissue I could reach. When the patient came from under the influence of ether, the nose was washed out with a solution of bichloride of mercury (1-2000) and insufflated with iodoform. The patient made a rapid recovery, with almost an entire cessation of asthmatic paroxysms. After the parts had thoroughly healed, it was found that more than half of the middle turbinated bone had been removed.

The inflammation in the antrum subsided under the treatment previously adopted. The patient did well until he contracted the grippe, which in his weakened and depressed state of health came near proving fatal to him.

When last heard from he was much improved in general health, but he has not entirely rallied from the melancholy and depressed mental condition which has been a marked feature of the case from the beginning.

CASE II.—Lieut. ——, U. S. A., consulted me in June, 1889, stating that he was suffering from nasal catarrh, and gave the following history: He has had hay fever every autumn since 1878, except for the three years he spent in South America, where, at an elevation of 9,000 feet, he was entirely free from all catarrhal symptoms. In 1882 he had the right upper second molar tooth filled, and shortly afterwards he had an attack of facial neuralgia, followed by an alveolar abscess. Last 4th of March he contracted a severe cold in the head, and since then he has had a profuse secretion of fetid pus from the right side of the nose.

On examination there was no swelling of the face, but there was some tenderness on pressure. The inferior turbinate body on the right side was dilated, but not hypertrophied. Under the influence of cocaine it contracted sufficiently to allow the middle meatus to be brought into full view. No pus was found there, nor in the post-nasal space.

The diagnosis of abscess of the antrum was made, and as it was dependent originally upon the tooth, he was advised to have the second molar extracted. Before this was done, however, the filling was removed, and a quantity of very fetid gas escaped.

On removal of the tooth its anterior root was found to have perforated the floor of the antrum, and the pulp cavity communicated directly with it.

The alveolar process was found to be somewhat necrosed around the tooth socket. This was removed, and the opening into the antrum enlarged. The cavity was washed out thoroughly with warm distilled water. A large quantity of very fetid pus escaped through the nose. The antrum was syringed out daily with mild antiseptic and stimulating lotions, with the effect of greatly reducing the amount of secretion, but not entirely checking it. There is probably some pocket which is so situated that the applications do not thoroughly reach the inflamed surface. The case is still under observation.

CASE III.—Mrs. C. came under observation in May, 1889, complaining of naso-pharyngeal catarrh and loss of smell.

The condition then was as follows: The middle turbinate bodies were red and swollen; no secretion in either

nasal chamber. On post-nasal inspection the posterior ends of the middle and superior turbinated bodies and the fornix were bathed with a white secretion.

She complained of the great annoyance from the secretions dropping back into the pharynx.

The middle turbinated bodies were cauterized with chromic acid, with the result of greatly reducing them in size and improving the sense of smell. She then passed from under observation, and I did not see her again until November 30th, when she stated that the sense of smell was improving, but the quantity of post-nasal secretion was greater than formerly. Inclining the head forward caused the secretion to flow from the nose, which she thinks is confined to the left side. Her husband and children complain of a bad odor of her breath.

I made frequent examinations of the nose, but could not find any secretion in the cavities. The post-nasal was about in the same condition as previously described. The teeth were in good condition, only one or two having small amalgam fillings.

Not being able to say definitely what was the source of secretion flowing from the nose, I aspirated the left antrum through the middle meatus, and drew off about two drachms of a sero-mucous fluid.

The diagnosis made was a catarrhal inflammation of the antrum, complicated with a catarrhal inflammation of the posterior ethmoid cells and of the sphenoidal sinus.

As the patient objected to losing a tooth, I determined to open the antrum through the inferior meatus with Cohen's nasal drill.

On December 17th she was put under the influence of nitrous oxide gas, and I perforated the antrum just anterior to the middle of the inferior meatus. The drill was withdrawn and the canula left in the opening until she came from under the influence of the gas. The cavity was then syringed out with warm distilled water, but as there was some haemorrhage following the operation, it was impossible to say what the character or quantity of the secretion was. The haemorrhage ceased in a short time. The next day the patient expressed herself as greatly relieved; the secretions into the post-nasal space and from the front of the nose had greatly diminished.

The antrum was washed out daily for ten days with a mild alkaline solution through the opening in the nose, at the end of which time, all secretions from the cavity seem-

ing to have ceased, the treatment was discontinued. There still remained a diminished post-nasal secretion, which gave the patient very little annoyance.

In conclusion, the points to which I would respectfully draw attention are:

1st. The disease is a serious one, and, owing to the absence of positive signs, it frequently goes unrecognized for a long time.

2d. That with the aids to the diagnosis mentioned in this paper there can be no reasonable excuse for not recognizing its presence.

3d. In many cases the easiest and simplest method of treatment is to open the sinus through the alveolar process; but when the cause of the disease is intra-nasal, the opening made in the inferior meatus by means of Cohen's nasal drill will offer many advantages over the alveolar operation.

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